Letter to the editor on "Relationship between changes in motor capacity and objectively measured motor performance in ambulatory children with spastic cerebral palsy"

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To the Editor:

With great interest, we read the article of Elisabeth Halma and colleagues, entitled "Relationship between changes in motor capacity and objectively measured motor performance in ambulatory children with spastic cerebral palsy" (Halma, 2019) and we would like to commend her and her team on performing such a laborious trial with 65 children with cerebral palsy.

This clinical trial investigated the effects of a 12-week intensive treatment period on motor capacity (what children can do in a standardized environment) and motor performance (what children do in daily life) (Holsbeeke, 2009). Thereby, the authors found that changes in motor capacity explained 1-6 % of the changes in motor performance after the 12-week treatment period and 7-16 % at the 12-week follow-up. They concluded that "changes in motor capacity are mostly not accompanied by changes in objectively measured motor performance after an intensive treatment period for ambulatory children with CP." They further recommended that the training of motor capacity should be supplemented by the training of motor performance.

Although we strongly support their recommendation, we would like to express some concerns and highlight why we see the risk of a premature closure regarding the conclusions drawn from the admittedly very weak correlation between capacity and performance.

The authors used three outcome measures to quantify motor capacity: 1) The number of sit-to-stand transitions within 30 seconds; 2) the comfortable walking speed during a 10-meter walking trial, and 3) the total score of the Gross Motor Function Measure (GMFM-66) which contains 66 items including lying, rolling, sitting, crawling, kneeling, standing, walking, running, and jumping activities. Thus, these outcome measures address specific aspects of specific activities. To quantify motor performance, accelerometry was applied with the outcome measure of activity counts. Activity counts are a measure of physical activity intensity and do not incorporate the underlying type of performed activities (Rachele, 2012).
The selected outcome measures in this study do, therefore, not assess the same aspect of motor activities, and it is a matter of comparing apples to oranges.

In our opinion, it is of high importance to compare like with like. The use of the same outcome measure to quantify motor capacity and motor performance, such as average walking speed in a standardized setting and daily life, might have revealed different results and potentially a higher correlation between changes in capacity and performance. As long as we have to deal with differences in outcome measures between the constructs (systemic bias), we will never be able to disentangle that from the differences in the children's behavior (ground truth). And only by having comparable outcome measures, will it be possible to fully quantify the person-environment interaction as an underlying factor to explain differences between capacity and performance.

However, and here we have to come to the authors' defense, it currently is rather difficult to measure the same motor activities during inpatient rehabilitation and at home, especially in children with neuromotor disorders. Relying on reporting-based outcomes entails the possible issue of proxy or recall bias (Clanchy, 2011) and limited inter-rater reliability (especially when dealing with different roles, e.g. parents

vs. therapists)(James, 2013). Accordingly, Halma et al. made use of accelerometry, which is an auspicious tool. From a hardware perspective, requirements are already well met with inertial measurement units getting smaller and having a longer battery life. However, in the development of necessary algorithms to extract the relevant information, we are not yet far enough to fuel this paradigm shift, especially for the usually very heterogeneous population of children with neuromotor disorders. Nevertheless, more and more research works emerge that use inertial measurement units in daily life to identify specific motor activities rather than just using activity counts. This will be a key for future studies investigating the interrelationship between motor capacity and performance.

Until we reach that stage, we suggest staying skeptical, if no correlations between outcome measures of motor capacity and motor performance can be found.

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